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TASK SCHEDULING AUTOMATION AND ORGANISATIONAL EFFICIENCY: STUDY OF SELECTED FIRMS IN OGUN - STATE NIGERIA

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Abstract:

Task scheduling automation was examined to provide evidence on its effect on organsational efficiency by reference to two fully automated firms in Ogun State of Nigeria. Organisational efficiency was measured in terms of individual's commitment to work, productivity, and quality output and workflow efficiency. A structured questionnaire was administered to 56 employees from both firms. The inferential statistical tool, specifically the regression analysis measured the effect of automated task scheduling on workflow efficiency and whether individual commitment and productivity increased with the use of time tracking software. The result revealed that task scheduling had a significant effect on workflow efficiency. Task scheduling explained about 33.9%(R^2 = 0.339) variation of workflow efficiency; and time tracking software's ability to impel increase in employees' commitment to work was not significant ($p < 0.01$). It was recommended that task scheduling should be considered by firms as it gives employees a clearer insight into organization's objectives and assist firms in meeting with daily tasks, urgent orders and deadlines. Additionally, time tracking software would permit task and time monitoring in such a way that employees time are judiciously utilised for organisational efficiency

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1.0 INTRODUCTION

High performance organisations are built by strong and dedicated workforce based on well articulated strategies and policies geared toward perk up productivity and efficient performance. The American Management Association (2007) acknowledged that flourishing organisations are built on consistent strong strategies and hiring the right people who would consistently resort to work standards to occupy positions.

Work standards vary among firms, but one standard work practice common to all firms is apt work time response. In developed countries employers it is observed that work time are jealously managed by employees. Successes recorded in developed countries in this respect are likely due to, First, organised work schedule effective with employees taking active part in the scheduling process. Secondly, employees are conscious of time management, well cut-out task and teamwork. Thirdly, time tracking software are used basically to record time spent on tasks; and fourth, cooperation with defined workflows.

In less developed countries, employees spend much time on unassigned tasks, burn time on unproductive activities and utilise the employer's time for personal activities. Employees seldom meet with their expected daily productivity thus create complexity for the organisations in meeting with deliverables, deadlines and competing favorably. Consequently, operational efficiency is hindered and threat posed to the overall efficiency of the organisation. In Nigeria for example, there is this philosophy of "African time" (an ideology by Africans to commence programs, events, tasks, behind the scheduled/standard time) prevalence and task-time scheduling haphazardness exist.

In certain climes of some less developed countries, the traditional (or manual) methods of preparing timetables, schedules of programs, calendar for sessions abound. The issue often is: are these schedules adhered to? Most of the time, No. due to the African culture of 'African time', and other related causes of share negligence as discipline are not adequately melted, since lack of timeliness most time is a problem from the top hierarchy. Additionally, employees waste time on unproductive activities, which would eventually lead to difficulty in meeting strategic goals and probable threat to organsiational survival at the long run.

The existence of multinational companies in Nigeria has however brought in some efficiency stimulators. This study examines some of these simulators such as, timesheet, time tracking and task management software in order to continually maintain an efficient workflow, labour productivity and indeed overall high organisational efficiency. Literature has devoted less attention to this crucial area. Instead more attention has been given to issues of improper treatment of workers, faulty production, consumer inconveniences and production damage to the environment (e.g., Yuksel, & Murat, 2005; Ramachandran, 2010). Hence, it becomes imperative for organisations to focus on task management and rescheduling for efficiency.

This study is poised to serve as a rescue mechanism for low performing organisations and sustainability acumen for high performing organisations in less developed countries through attempts to obtain empirical evidence on the following: determine how task management can help in achieving workflow efficiency; ascertain whether time tracking software can propel increased productivity of employees; and commitment to work. Also, examine whether time management can lead to quality output in organisations.

The paper is divided into six sections, following the introductory section is the review of literature, the third section presents the hypotheses, the method of the research is presented in the fourth section, and the results are presented and discussed in the fifth section while the sixth section presents the conclusion.

2. BRIEF LITERATURE REVIEW

Effective application of task and time management would require examination of some related principles as guidance to efficient management of time expected to be spent on each separate task. Examples are the Pareto analysis, Eisenhower Decision Principle and POSEC principle.

Pareto Analysis Principle

The Pareto analysis principle establishes the rule to cower disproportion through 20 and 80 symmetry. This symmetry contains the idea that 80% of tasks can be completed in 20% of the disposable time; and 20% of tasks will take up 80% of the time. The principle tends to sort tasks into two parts. Pareto analysis recommends that tasks that fall into the first category should be assigned a higher priority (Chad, 2014). It has however been criticized for its technicality that could be time consuming. Pareto analysis as a formal technique is only useful where many possible courses of action are competing for attention.

Eisenhower principle

This principle postulates that what is important is seldom urgent and what is urgent is seldom important. Using the Eisenhower decision principle, all tasks are evaluated using the criteria important/unimportant and urgent/not urgent, and then placed in quadrants in an Eisenhower Matrix also known as an "Eisenhower Box" or "Eisenhower Decision Matrix". A basic "Eisenhower box" helps to evaluate urgency and importance. Items may be placed at more precise points within each quadrant. Tasks are then handled in different forms: (i) important/urgent quadrants are done immediately and personally; (ii) important/not urgent quadrants get an end date and are done personally; (iii) unimportant/urgent quadrants are delegated; and (iv) unimportant/not urgent quadrants are dropped (Fowler, 2012).

POSEC Model

POSEC is an acronym for Prioritize by Organizing, Streamlining, Economizing and Contributing. The model dictates a template which emphasizes an average individual's immediate sense of emotional and monetary security. It suggests that by attending to one's personal responsibilities first, an individual is better positioned to shoulder collective responsibilities. Inherent in the acronym is a hierarchy of self-realization, which mirrors Abraham Maslow's hierarchy of needs: Prioritize time by defining goals; organize things to be accomplished regularly; streamline things that by choice may not be done, but must be done; economize things to do or may like to do, but are not pressingly urgent; and contribute by paying attention to the few remaining things that make a difference (Philipharman, 2015).

THEORETICAL CONSIDERATION

Task and time management calls attention to two theories: theory of planned behavior and Technology acceptance theory.

Theory of Planned Behaviour

The theory of planned behavior (TPB) links beliefs and behavior. It is one of the most predictive persuasion theories. The theory states that attitude toward behavior, subjective norms, and perceived behavioral control, together shape an individual's behavioral intentions and behaviors (Ajzen, 1991).

Technology Acceptance Theory

Technology Acceptance Theory is an information systems theory that models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, such as Perceived usefulness and Perceived ease-of-use. That is, the degree to which a person believes that using a particular system would enhance job performance; and   the degree to which a person believes that using a particular system would be free from effort (Davis, 1989). Despite its usefulness the theory has been criticized for questionable heuristic value, limited explanatory and predictive power (Chuttur, 2009).

Implications of these Theories to this Study

The theory of planned behavior is a very powerful and predictive model for explaining human behavior. The manner in which employees will react to task and time management will depend more on planned behaviour or intention. The employer need to use right tools, skills and techniques based on perceived behavioral control.

Technology acceptance theory is a model that determines how users come to accept and use a technology. Time tracking software, automated timesheet software for example, would be accepted on perceived ease of use. In other words, That is, the degree to which employees accept that using the task and time software would enhance job performance, motivate usage of it.

CONCEPTUAL FOUNDATION

The study conceptualizes task and time management as useful tools for organisational efficiency. These concepts are here discussed with some extracts from Wikipedia encyclopedia.

Task Management

Task management is the process of managing a task from start to finish (life cycle). It involves task planning, testing, tracking and reporting. With task management individuals or groups share accomplishment and achieve goals or collective goals. Karsten and Rodriguez (2010), defined task management as the process of managing a task through the completion of its life cycle, tracking the task's progress and sharing information about the task with others. Just as tasks are differentiated by complexity, from low to high, so also is its management.

Task Scheduling

This involves establishing the amount of work to be done by different employees and the time each element of task should start and be completed. Lansburgh and Spriegel (1995 cited in Kalyan 2013) stated that scheduling involves establishing the amount of work to be done and the time each element of the work will start, or the order of work. This includes allocating the quality and rate of output of the plant or department and also the date or order of starting of each unit of work at each station along the route prescribed.

Types of Time Tracking Software

There are two basic types of time tracking software, the timesheet software and time tracking/recording software. Many time tracking software companies offer workforce management packages that include time and attendance, scheduling, absence management, human resources, payroll, talent management, and labor analytics (Wikepedia, 2015).

Timesheet Software

Timesheet software is accounting software used to maintain timesheets. This was the first wave of the time tracking software when computers came to many offices, with the goal of replacing all heavy paperwork for greater organisation. Timesheet software allows entering time spent performing different tasks while working. When used within companies,
employees enter their time into an electronic timesheet, which can then be approved or rejected by supervisors or project managers. Since 2006, timesheet software has been moving to mobile platforms that is, smart phones and tablets, enabling better tracking for employees who are not sitting at a workstation all day long (Chad, 2014).

Time Tracking/Recording Software

Time tracking/recording software automates time tracking process by recording what activities, when and

for how long it is performed on a computer. This was the second wave of the time tracking software. The idea is to get the actual picture about computer usage. Automatic time tracking/recording software shows applications, documents and websites usage. When used within companies, this software allows monitoring employees' productivity by recording computer and internet usage and it can be used to help to complete timesheets (Chad, 2014).

A Chart on Time Tracking Methods

There are several ways companies track employee time using time tracking software as presented in the Table.

Table 1: Time Tracking Methods

S/N	Time Tracking Methods	Operation	Forms of Time Tracking Software	Function
1	Duration Time Tracking	employee enters the duration for the task regardless what time was it worked on	Standalone	used only to record timesheets, and generate reports
2	Chronological Time Tracking	employee enters actual start and end time for the task	Integrated into accounting system	timesheet data is directly fed into company accounts
3	Exception- Based Time Tracking	system automatically records standard work hours except for approved time off	Integrated into billing system	used to generate invoices, especially used by contractors and professionals such as lawyer
4	Clock-in Clock- out Time Tracking	employee manually records arrival and departure to and from work	Integrated into project management systems	timesheet data is used in project management software to graph the effort being spent on each project or task
5	Time Tracking Monitoring	system records active and idle time of employee using a computer	Integrated into payroll system	timesheet data is used in payroll software to pay employees based on their time worked
6	Location-based Time Tracking	system determines working status of an employee based on his/her location	Integrated with MS-outlook	outlook appointments contain most of the information needed to make a timesheet entry; an outlook timesheet

				allows users to convert appointments to timesheets.
7	Input time from Outlook	with outlook holding duration, converting outlook appointments to timesheets saves duplication.	Integrated with resource scheduling	bidirectional integration allows schedulers to schedule staff on jobs, which once complete can be confirmed and converted to a timesheet
8	Resource Scheduling Time Tracking	scheduling resources in advance, employee schedules can be easily converted to timesheets	-	-

Complied by Researcher by reference to Wikipedia (2015)

Time Management

Time Management describes a process or act involving planning and exercising conscious control over the amount of time spent on specific activities especially to increase effectiveness, efficiency and productivity. It involves a time clock or web based application used to track an employee's work hours. Time management systems give employers insights into activities of employees, thus enabling employers to control labor costs and increase productivity (Morgenstern, 2004). Examples of time management styles are as discussed below.

Getting Things Done (GTD)

The basic idea behind Getting Things Done (GTD) style was to get all small tasks finished immediately and big tasks are divided into smaller tasks and then completed immediately. The driving force of GTD is to encourage the user to get tasks and ideas out on paper as quickly as possible (Allen, 2001).

Pomodoro

Pomodoro is a time management style developed by Francesco Cirillo in the early 90's with the idea that frequent breaks makes the user more productive as long as they stay committed to the work and do not allow distraction. The Pomodoro technique is very simple. It measures the task and divide it into 25-minute intervals. Each 25-minute interval is measured as one "Pomodoro" and between each Pomodoro there is a short break (usually 5 minutes). The method is based on the idea that frequent breaks can improve mental agility. After doing 4 "Pomodoros" the user can take a longer break.

The stages of planning, tracking, recording, processing and visualizing are fundamental to this technique. In

the planning phase tasks are prioritized by recording them in a "To Do Today" list. This enables users to estimate the effort tasks require. As pomodori are completed, they are recorded, adding to a sense of accomplishment and providing raw data for subsequent self-observation and improvement. The technique has inspired application software for a variety of platforms (Wikipedia 2015).

Triskelion

Triskelion system is the time management system launched in 2011 to manage time through playing the graphic-adventure game- Triskelion. The system is based on the three pillars of time management: manage, plan, and do-it now. Triskelion players experience a simulated twenty-one day adventure, and manage mail, organize tasks, attend meetings, make in-person visits and travel to exotic locations.

Players define goals, develop plans and discover strategies for achieving their goals and plans. Feedback and evaluation is ongoing. Players master how to keep life and work in- boxes neat and organised, controlling and meeting commitments and challenges. Players focus on improving concentration, reducing distractions and increasing the speed by which they are able to complete tasks without sacrificing accuracy (Wikipedia 2015).

Organisational Efficiency: a Result of Task Scheduling

Efficiency measures the relationship between inputs and outputs or how successfully the inputs have been transformed into outputs (Low, 2000) is the extent to which time, effort, or cost is well-used for the intended task or function. It often comprises specifically the capability of a specific application of effort to produce a specific outcome effectively with a mini um amount or quantity of waste, expense, or unnecessary effort.

Organisational efficiency reflects the improvement of internal processes of the organisation, such as organisational structure, culture and community. Excellent organisational efficiency could improve entities performance in terms of management, productivity, quality and profitability. The Pinprayong and Siengthai (2012) introduced seven dimensions, for the measurement of organisational efficiency: organisational strategy; corporate structure design; management and business system building; development of corporate and employees' styles; motivation of staff commitment; development of employees' skills; and subordinate goals.

3. HYPOTHESES DEVELOPMENT

Organisational efficiency has been a subject of debate as it has widely varying meanings in different disciplines. Pinprayong and Siengthai (2012) argued that there is a difference between business efficiency and organisational efficiency. Business efficiency reveals the performance of input and output ratio, while organisational efficiency reflects the improvement of internal processes of the organisation, such as organisational structure, culture and community. Excellent organisational efficiency could improve firm's performance in terms of management, productivity, quality and profitability.

Based on this premise, this study expects that efficiency in workflow, employees' commitment, productivity and quality output will emanate from the use of task scheduling. Task scheduling will be functional with good time management and time tracking. Thus, the following hypotheses are formulated to affirm the expectations of this research are:

H01: Task Scheduling has no effect on workflow efficiency

H02: Time tracking software has not propelled increased productivity of employees H03: Time tracking software has not impelled increase in employees' commitment H04: Time management has no effect on quality output.

4. METHOD

The survey research design was adopted to verify the problem hypothesis through gathering data from the Front line managers, Middle level managers and a few numbers of employees from an indigenous hospital located at Ota of Ogun State, having 146 employees, 16 middle line managers and 14 front line managers; and a branch office of a multinational corporation at Agbara of Ogun State having over 500 employees, 10 middle managers and 15 front line managers. The firms' time and task are fully automated using the clock in clock out time tracking and time tracking monitoring software. A sample size of 56 unit members were randomly selected as respondents for the study, thus granting everyone in the population an equal chance of being picked. Thirty eight (38) copies of the questionnaire were duly completed and returned.

Measurement of Variables

The questionnaire incorporated measures of usage and perceptions of task scheduling administration developed from core components of the task management system - TMS identified in literature (Karsten & Rodriguez, 2010). The variables measured were task scheduling, time tracking and time management software; productivity, quality output and workflow efficiency. Respondents were to indicate usage and perception of efficiency in the task management system aspects in their companies measured on a five-point scale. On the efficiency scale, 1.0 represented not efficient, 2.0 denoted slightly efficient, 3.0 denoted efficient 4.0 indicated highly efficient and 5.0 indicated very highly efficient tracking system. The perception of efficiency was measured using an index computed from the responses to the questionnaire items.

A questionnaire was constructed and duly validated for administration. The Cronbach's alpha test was used to determine the reliability of the instruments. The results, which showed Cronbach Alphas greater than 0.7 for all the multi-item variables indicated sufficient reliability according to Nunnally and Bernstein (1994).

Analysis of Data

Simple linear regression analysis was used to test the four hypotheses because of its statistical nature of estimating relationships: effect, prediction or determination among variables. Hypothesis 1 measured the effect of task scheduling on workflow efficiency, while hypothesis 2 and 3 measured the effect of using time tracking software to propel employees' productivity and commitment to work while hypothesis 4 measured the effect of time management on quality output.

5. RESULTS

The result as shown in Table 1 revealed a significant effect of task scheduling on workflow efficiency. Task scheduling (R^2 = 0.339) can explain about 33.9% variation of workflow efficiency. F value of 18.434 (P>0.05) showed the fitness of the model in explaining workflow efficiency. The null hypothesis one was thus rejected.

Table 1: Task Scheduling effect on workflow efficiency

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.582[a]	.339	.320	.822

a. Workflow efficiency

ANOVAa

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12.450	1	12.450	18.434	.000[b]

1	Residual	24.313	36	.675		
	Total	36.763	37			

a. Dependent Variable: Workflow Efficiency

Predictors: (Constant), Task Scheduling

Tables 2 and 3 present results on regression coefficient showing that using time tracking software to propel employees' productivity increase is significant (p< 0.01) with

β =.610 and t- value = 4.206 while time tracking software's ability to impel increase in

employees' commitment to work was not significant (p< 0.01). The null hypothesis two was rejected and null hypothesis three not rejected. This implies that time tracking has association with employees productivity and no association with employees commitment.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.590	.576		2.762	.009
	Time tracking	.047	.282	-.035	-.167	.869

Table 2: Time tracking software and employees' productivity

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.482	.298		1.621	.115
	Time tracking	.515	.122	.610	4.206	.000

a. Dependent Variable: productivity

Table 3: Time tracking software and employees' commitment

Coefficients
a. Dependent Variable: commitment

Confirming whether a significant effect exist between time management and quality output, hypothesis three was tested as shown in Table 4. The result revealed that there is a significant effect of time management software usage on quality output, explaining about 56% (R^2 of 0.560) variation on quality output. This implies the measurement of strength of the association between time management and quality output, thus rejecting the null hypothesis three.

6. CONCLUSION

This study investigated task scheduling and the use of time tracking and time management software in two fully automated firms in Ogun State of Nigeria and the effect of their usage on workflow efficiency, productivity, commitment and quality output. The study found that task scheduling can explain 33.9% variation of workflow efficiency. In time tracking, the employees perceived that monitoring tasks, idle time with the aid of time tracking software increased employees' productivity but not employees' commitment; and time management software in actually functional in these firms. It can explain 56% variation in quality output.

These evidences give a clearer insight to the need for task and time management as it has effect on organisational efficiency. Employees, on the one hand would understand tasks for each day, avoid waste or time wasting activities since they are in the know of the tracking software to record any idle time. These evidences corroborate the findings in a study conducted by Omorogbe, (2014) on integrated cost control system effect on organisational financial performance and non-financial performance of firms in Nigeria, where scheduling key task-service delivery/production (TSD) applications usage efficiency was measured. The study revealed that scheduling key task-service delivery/production (TSD) applications had high efficient utilisation with mean scores of 4.08. The study further revealed that in non- financial performance model, the efficiency of TSD can explain variation of about 82.2% of non-financial performance and 30.5% of turnover growth rate. It was recommended in that study, that firms should go automated in task and time management as a lot of costs savings as well as efficiency are derived.

Task scheduling operations need to be changeover to automated task scheduling as this is a worthwhile efficiency strategy as evidenced in this study. The use of time tracking software to keep tap of organisational activities toward achieving firm's objectives has been revealed. Firms should invest in time tracking software as dividends there from are enormous. It is recommended that task scheduling should be considered by firms as it gives employees a clearer insight into organisation's objectives and assist firms in meeting with daily task, urgent orders and deadlines. Additionally, time tracking software would permit task and time monitoring in such a way that employers time are jealously managed through judicious utilisation for organisational efficiency.

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